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EXAMINER	
MICHALSKI, JUSTIN I	
ART UNIT	**PAPER NUMBER**
2644	9

DATE MAILED: 10/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	09/658,010	BHARITKAR ET AL.
	Examiner	Art Unit
	Justin Michalski	2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/08/2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on ____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3 and 8*.
4) ☐ Interview Summary (PTO-413) Paper No(s). ____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 32 is rejected under 35 U.S.C. 102(b) as being anticipated by Kimura (US Patent 5,172,358). Kimura discloses a method for providing an automatic loudness compensation (Figure 1), comprising the steps of: encoding input variables (A/D converter), processing encoded input variables (Figure 1); and, decoding processed encoded input variables into output variables (D/A converter).

3. Claims 32-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Iwamura (US Patent 5,172,417).

Regarding Claim 32, Iwamura discloses a method for providing an automatic loudness compensation (Figure 1), comprising the steps of: encoding input variables (Decision factor changing section 6), processing encoded input variables (Fuzzy Equalizer 1); and, decoding processed encoded input variables into output variables (Decision factor changing section 6).

Regarding Claim 33, Iwamura further discloses the encoding of input variables is done by membership functions (i.e. fuzzy sets) as shown in Figure 4.

Regarding Claim 34, Iwamura further discloses an expert does the processing of the encoded input variables since one with knowledge of processing input variables (i.e. an expert) would be needed to carry out the method.

Regarding Claim 35, Iwamura further discloses the expert is a rulebase (Figures 3, 5, 6, and 7).

Regarding Claim 36, Iwamura further discloses the decoding of the processed encoded input variables is done by defuzzification (Iwamura discloses decision factor changing section 6 outputs the changed signal as an output audio signal 7) (i.e. defuzzification) (Column 3 lines 37-40).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of House (US Patent 4,809,338).

Regarding Claim 1, Kimura discloses a method of providing an automatic loudness compensation circuit (Figure 1) comprising: receiving an input audio signal containing bass content (Input to A/D Converter); coupling the input audio signal to a voltage detector having an output voltage (reference 16); coupling the output voltage of the voltage detector to a filter circuit (filter 15) for boosting the bass content of the input audio signal based on the volume level of the audio signal (Column 4, lines 58-60); and coupling an output of the filter circuit (Filter 15) to a power amplifier for amplifying the filter circuit output (D/A Converter). Kimura does not disclose the frequency of the filter circuit inversely related to the input audio signal. House discloses a device (Figure 1) which controls the bass contour based upon the signal provided by a power amplifier to a control circuit (Figure 2). House discloses Figure 3 which describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16) in order to enhance the sound quality at lower signal levels as determined by predetermined loudness contours (Column 5, lines 18-21). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Kimura's method uses a feed-forward approach of adjusting the low frequency boost while House uses a feedback approach as

described in Figure 2 (Column 4, line 55 - Column 5, line 17). It would have been obvious to one or ordinary skill in the art at the time the invention was made to combine the feed-forward method and low-pass frequency boosting circuit as described by Kimura with the inverse frequency response as disclosed by House in order to enhance the sound quality at lower signal levels.

Regarding Claim 2, as stated above apropos of claim 1, Kimura as modified makes obvious all elements of that claim. House further discloses driving an audio speaker with the amplified filter circuit output (Figure 1, Amp 34).

Regarding Claim 9, as stated above apropos of claim 1, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices such as a compact disc player (Column 1, lines 26-28).

Regarding Claim 10, as stated above apropos of claim 1, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices such as a tape recorder (i.e. cassette) (Column 1, lines 26-28).

Regarding Claim 11, as stated above apropos of claim 1, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices which could include a digital video disc (Column 1, lines 26-28).

Regarding Claim 12, as stated above apropos of claim 1, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices which could include a microphone as an audio device (Column 1, lines 26-28).

6. Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura as modified as applied to claim 1 above, and further in view of Onetti et al. (US Patent 5,812,687).

Regarding Claim 3, as stated above apropos of claim 1, Kimura as modified makes obvious all elements of that claim. (House further discloses a capacitance multiplier circuit comprising a light emitting device (LED 104) and a light sensitive resistor (resistor 64).) Kimura as modified does not disclose the use of a capacitance multiplier circuit. Onetti et al. discloses a circuit for controlling frequency response characteristics of a signal (Figure 8) containing a capacitance multiplier. By selectively changing the resistors r1, r2, and r3 (i.e. variable resistor) with switches s1, s2, and s3 the phase response of the circuit can be obtained by equation by $f_o = 1/(2\pi RC)$ (Column 4, line 1). Onetti et al. further teaches capacitance multiplying circuits are integrated in order to limit the number of components. Kimura as modified and Onetti et al. both disclose devices that alter the frequency response of a signal using a variable resistor in the form of a light sensitive resistor or a switching circuit. Therefore it would have been obvious to one skilled in the art at the time the invention was made to combine the capacitance multiplier circuit as disclosed by Onetti et al. with the light sensitive resistor disclosed by Kimura in order to reduce the number of components as taught by Onetti et al.

Regarding Claim 4, as stated above apropos of claim 3, Kimura as modified makes obvious all elements of that claim. House further discloses control circuit

comprising low-pass filter is connected to the light emitting device and light sensitive resistor (Column 2, lines 26-35).

Regarding Claim 5, as stated above apropos of claim 4, Kimura as modified makes obvious all elements of that claim. Kimura further discloses compensating for loudness characteristics of the human ear (Column 1, lines 6-8) that would include the frequency range of the human ear.

Regarding Claim 6, as stated above apropos of claim 5, Kimura as modified makes obvious all elements of that claim. House further discloses as the signal level increases the amount of low frequency boost is less (i.e. lowpass filter attenuates less bass as signal increases) (Column 5, lines 18-31).

Regarding Claim 7, as stated above apropos of claim 3, Kimura as modified makes obvious all elements of that claim. House further discloses the greater the voltage the higher the frequency of the components of the signal appearing at the terminal of the amplifier for the speaker (Column 5, lines 6-16) (i.e. Filter allows less low frequency components by decreasing of corner frequency of the circuit). Resulting in a bass boost which is inversely proportional to the corner frequency of the circuit.

Regarding Claim 8, as stated above apropos of claim 3, Kimura as modified makes obvious all elements of that claim. House further discloses as the lower the resistance of the light sensitive resistor the higher will be the frequency of the components of the signal appearing at the input terminal (i.e. less bass content) (Column 5, lines 6-16).

7. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura as modified as applied to claim 12 above, and further in view of Werrbach (US Patent 5,359,665).

Regarding Claim 13, as stated above apropos of claim 12, Kimura as modified makes obvious all elements of that claim. Kimura as modified does not disclose the microphone input audio signal coupled to a summing circuit having an output signal. Werrbach discloses a device with an audio input signal (Figure 1) and an audio bass frequency enhancement circuit. The input audio signal (i.e. microphone input) and output of the filter circuit (references 3 and 5) are summed together at combiner 4 having an output signal. Werrbach teaches the time and amplitude relationships between the audio signals in the two paths produces a dynamically changing frequency response characteristic and longer duration of bass frequencies after recombination of the two parts (Column 1, line 65 – Column 2, line 2). Therefore it would have been obvious to one skilled in the art at the time the invention was made combine the method of summing the input audio signal and the filtered signal to produce a dynamically changing frequency response and longer duration of bass frequencies resulting in a higher fidelity audio signal.

Regarding Claim 14, as stated above apropos of claim 13, Kimura as modified makes obvious all elements of that claim. Werrbach discloses the use

of subsequent audio amplifiers which could include a power amplifier (Column 1, lines 13-14).

8. Claims 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of House (US Patent 4,809,338).

Regarding Claim 15, Kimura discloses a method of providing an automatic loudness compensation circuit comprising: receiving an input audio signal including bass content (Input to A/D converter); coupling the input audio signal to a voltage detector to produce an output voltage (Reference 16); coupling the output voltage of the voltage detector to a control circuit (references 12, 15, 19), the control circuit comprising a filter circuit (Filter 15); coupling an output of the filter circuit to a power amplifier (D/A converter) for amplifying the filter circuit output; and driving an audio speaker with the amplified filter circuit output. Kimura does not disclose comparing the corner frequency of the filter circuit to the strength of the input audio signal or shifting the corner frequency such that the corner frequency is inversely related to the strength of the input audio signal. House discloses a device (Figure 1) which controls the bass contour based upon an audio signal provided to a circuit. House discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency

components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Kimura's method uses a feed-forward approach of adjusting the low frequency boost while House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17). It would have been obvious to one or ordinary skill in the art at the time the invention was made to combine the feed-forward method and low-pass frequency boosting circuit as described by Kimura with the inverse frequency response as disclosed by House in order to enhance the sound quality at lower signal levels.

Regarding Claim 19, as stated above apropos of claim 15, Kimura as modified makes obvious all elements of that claim. House further discloses the greater the voltage the higher the frequency of the components of the signal appearing at the terminal of the amplifier for the speaker (Column 5, lines 6-16) (i.e. Filter allows less low frequency components by decreasing the corner frequency of the circuit). Resulting in a bass boost which is inversely proportional to the corner frequency of the circuit.

9. Claims 16-18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura as modified as applied to claim 15 above, and further in view of Onetti et al. (US Patent 5,812,687).

Regarding Claim 16, as stated above apropos of Claim 15, Kimura as modified made obvious all elements of that claim. House further discloses a light emitting device (Figure 2, LED 104) coupled to a light sensitive resistor (resistor 64) where the output of the light sensitive resistor (i.e. variable resistor) is coupled to a low pass filter for adjusting the bass content of the input audio signal (House discloses the greater the light emitted by LED 104 the higher the frequency components of the signal (i.e. less bass content is passed through) (Column 5, lines 11-16). Kimura as modified does not disclose utilizing a capacitance multiplier circuit. Onetti et al. discloses a circuit for controlling frequency response characteristics of a signal (Figure 8) containing a capacitance multiplier. By selectively changing the resistors r1, r2, and r3 (i.e. variable resistor) with switches s1, s2, and s3 the phase response of the circuit can be obtained by equation by $f_o = 1/(2\pi RC)$ (Column 4, line 1). Onetti et al. further teaches capacitance multiplying circuits are integrated in order to limit the number of components. Kimura as modified and Onetti et al. both disclose devices that alter the frequency response of a signal using a variable resistor in the form of a light sensitive resistor or a switching circuit. Therefore it would have been obvious to one skilled in the art at the time the invention was made to combine the capacitance multiplier circuit as disclosed by Onetti et al. with the light sensitive resistor disclosed by Kimura in order to reduce the number of components as taught by Onetti et al.

Regarding Claim 17, as stated above apropos of claim 16, Kimura as modified makes obvious all elements of that claim. House further discloses responding to an increase in the input audio signal by energizing the light emitting device to produce a light source and decrease the resistance of the light sensitive resistor (House discloses the greater the amplitude the greater the light emitted by diode 104 and lower the resistance of the light sensitive resistor 64) (Column 5, lines 6-16). Onetti et al. further discloses equation $f_o = 1/(2\pi RC)$ (Column 4, line 1) which if the capacitor value was increased the corner frequency could change so bass boosting of the audio input signal is quickly removed.

Regarding Claim 18, as stated above apropos of claim 16, Kimura as modified makes obvious all elements of that claim. House further discloses responding to a decrease in the audio input signal by de-energizing the light emitting device within the filter circuit in order to prevent a light source and increasing the resistance of the light sensitive resistor (House discloses the led light source 104 being proportional to signal amplitude and inversely proportional to the resistance of the light sensitive resistor 64 (Column 5, lines 6-16) which would prevent a light source if input was low enough. Onetti et al. further discloses equation $f_o = 1/(2\pi RC)$ (Column 4, line 1) which if the capacitor value was decreased the corner frequency could change so bass boosting of the audio input is slowly added.

Regarding Claim 20, as stated above apropos of claim 16, Kimura as modified makes obvious all elements of that claim. House further discloses the lower the resistance of light sensitive resistor 64 the higher the frequency of the components of the signal appearing (Column 5, lines 6-16) (i.e. the lower the resistance of the light sensitive resistor the less bass content is boosted).

Regarding Claim 21, as stated above apropos of claim 16, Kimura as modified makes obvious all elements of that claim. House further discloses the light sensitive resistor 64 is optically coupled to LED 104 (Figure 2).

10. Claims 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over House (US Patent 4,809,338) in view Kimura (US Patent 5,172,358) and Muterspaugh (US Patent 4,661,851).

House discloses and automatic loudness compensation circuit (Figure 1) including a terminal coupled to an input audio signal from an external source and a signal supply having voltage sufficient to drive an output audio speaker (output from reference 20) comprising: a control circuit (Figure 2) including a filter circuit for adjusting a corner frequency associated with the filter circuit such that the corner frequency is inversely related to the input audio signal (House discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e.

filter allows less low frequency components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16); a power amplifier for increasing the power of the output signal from the low pass filter circuit (reference 54); and a terminal for providing an amplified output signal (terminals 1 and 11 of reference 54). House discloses a full-wave bridge rectifier for detecting an audio signal (Column 4, lines 59-63) near the circuit output but does not disclose a RMS voltage detector from the input audio signal. Kimura discloses a level detector (Figure 1, reference 16) that is used to as part of a loudness control circuit by detecting the average value of an audio input signal. Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Kimura's method uses a feed-forward approach of adjusting the low frequency boost while House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17). It would have been obvious to one or ordinary skill in the art at the time the invention was made to combine the feed-forward approach as taught by Kimura with the system as disclosed by House in order to produce a higher fidelity audio signal. House as modified does not disclose the use of a RMS detector providing voltage from the input audio signal.

Muterspaugh discloses an RMS detector (Figure 1, reference 34) which provides a control element for reference 20. It would be known to one in the art that an RMS detector could also be used as a method of detecting voltage level as shown by Muterspaugh. Therefore it would have been obvious to one skilled

in the art at the time the invention was made to combine the level detector used by House as modified with a RMS detector disclosed by Muterspaugh in order to obtain an accurate reading of the voltage level.

Regarding Claim 23, as stated above apropos of claim 22 House as modified makes obvious all elements of that claim. House further discloses the greater the voltage the higher the frequency of the components of the signal appearing at the terminal of the amplifier for the speaker (Column 5, lines 6-16) (i.e. Filter allows less low frequency components by decreasing of corner frequency of the circuit). Resulting in a bass boost which is inversely proportional to the corner frequency of the circuit.

Regarding Claim 24, as stated above apropos of claim 22 House as modified makes obvious all elements of that claim. House further discloses a light emitting device (Figure 2, reference 104) coupled to a light sensitive resistor (Resistor 64) which is coupled to a low pass filter (Column 2, lines 34-36).

Regarding Claim 25, as stated above apropos of claim 22 House as modified makes obvious all elements of that claim. House further discloses lower the resistance of the light sensitive resistor the higher the frequency components will be (i.e. less bass boost) (Column 5, lines 10-17) resulting in the bass boost being proportional to the resistance of the light sensitive resistor.

11. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of Hanna (US Patent 6,118,879) and Muterspaugh (US Patent 4,661,851). House

Kimura discloses an automatic loudness compensation circuit (Figure 1) including a terminal coupled to an input audio signal (input to A/D converter) from an external source and a signal supply having voltage sufficient to drive an output audio speaker comprising: means for adjusting a corner frequency of a filter circuit (Kimura discloses cut-off (i.e. corner frequency) can range from 20Hz to 500Hz (i.e. adjustable) (Column 4, line 13); means for amplifying the output signal from the filter circuit (D/A converter); and a terminal for providing an amplified output signal (output of D/A converter). Kimura discloses audio input voltage level detection circuit 16 which takes the average value of the voltage during a period of time (Column 2, lines 64-68) but does not disclose it being an RMS value or state the corner frequency in inversely related to the audio input signal. House discloses a device (Figure 1) which controls the bass contour or an audio signal. House discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16). Both Kimura and House disclose methods of providing loudness compensation using the level of an

f_1 = no filter
ref wrong Hanna

audio signal to manipulate a boosting filter. Kimura's method uses a feed-forward approach of adjusting the low frequency boost while House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17). It would have been obvious to one or ordinary skill in the art at the time the invention was made to combine the feed-forward method and low-pass frequency boosting circuit as described by Kimura with the inverse frequency response as disclosed by House in order to enhance the sound quality at lower signal levels. Muterspaugh discloses an RMS detector (Figure 1, reference 34) which provides a control element for reference 20. It would be known to one in the art that an RMS detector could also be used as a method of detecting voltage level as shown by Muterspaugh. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the level detector used by Kimura as modified with a RMS detector disclosed by Muterspaugh in order to obtain an accurate reading of the voltage level.

12. Claims 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of Muterspaugh (US Patent 4,661,851) and Werrbach (US Patent 5,359,665).

Regarding Claim 27, Kimura discloses a system for obtaining a first order bass boost compensation comprising: a terminal for receiving an audio input signal having a signal level (A/D converter); a level control for determining the level of the input audio signal (Volume Control 11); a control circuit for adjusting

the corner frequency such that the corner frequency (controller 12) (Kimura discloses frequency response can range from 20 Hz to 500 Hz) (Column 4, line 13); an amplifier coupled to the output of the circuit (D/A Converter); and a terminal for providing an amplified output signal to an audio speaker (output of D/A converter). Kimura does not disclose a power supply voltage, an RMS detector, a summing circuit, or corner frequency inversely related to input.

Werrbach discloses an audio bass frequency enhancement device (Figure 1) including an audio input signal (input to reference1) which could contain a signal from a microphone. Werrbach further discloses a summing circuit (combiner 4) which receives input from the audio signal and the automatic loudness compensation circuit (references 3 and 4). Werrbach teaches the time and amplitude relationships between the audio signals in the two paths produces a dynamically changing frequency response characteristic and longer duration of bass frequencies after recombination of the two parts (Column 1, line 65 – Column 2, line 2). Therefore it would have been obvious to one skilled in the art at the time the invention was made combine the method of summing the input audio signal and the filtered signal to produce a dynamically changing frequency response and longer duration of bass frequencies resulting in a higher fidelity audio signal.

House discloses a bass contour control network (Figure 2) which includes a power supply voltage of 12 to 16 volts (connection to reference 66). House further discloses a full-wave bridge rectifier for obtaining level of audio signal

(Column 4, lines 59-63). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Kimura's method uses a feed-forward approach of adjusting the low frequency boost while House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17). It is also known in the art that a RMS detector is also a method of obtaining a voltage level of signal. Therefore, it would have been obvious to one or ordinary skill in the art at the time the invention was made to combine the feed-forward approach as taught by Kimura with the system as disclosed by House in order to produce a higher fidelity audio signal and use an RMS detector as a method of obtaining signal voltage.

Regarding Claim 28, as stated apropos of claim 27, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices such as a compact disc player (Column 1, lines 26-28).

Regarding Claim 29, as stated above apropos of claim 27, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices such as a tape recorder (i.e. cassette) (Column 1, lines 26-28).

Regarding Claim 30, as stated above apropos of claim 27, Kimura as modified makes obvious all elements of that claim. Kimura further discloses use in audio devices which could include a digital video disc (Column 1, lines 26-28).

13. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of Werrbach (US Patent 5,359,665), and House (US Patent 4,809,338).

Kimura discloses a system for obtaining an automatic loudness compensation (Figure 1) comprising: a input terminal for receiving an audio input signal having a signal level (input to A/D converter); a level control coupled to the input terminal for determining the level of the input audio signal (Volume Control 11); an automatic loudness compensation circuit (Figure 1) having an output signal coupled to the level control comprising a filter circuit for adjusting a corner frequency associated with the filter circuit (Kimura discloses corner frequency can range from 20 Hz to 500Hz) (Column 4, line 13); an output terminal for providing an amplified output signal to an audio speaker (output of D/A converter). Kimura does not disclose a summing circuit for use with a microphone.

Werrbach discloses an audio bass frequency enhancement circuit (Figure 1) with an audio input signal (i.e. could be a microphone audio signal) and a summing circuit (combiner 4) which receives a input from the audio input and automatic loudness compensation circuit (Variable gain amplifier 3). Werrbach teaches the time and amplitude relationships between the audio signals in the two paths produces a dynamically changing frequency response characteristic and longer duration of bass frequencies after recombination of the two parts (Column 1, line 65 – Column 2, line 2). Therefore it would have been obvious to

one skilled in the art at the time the invention was made combine the method of summing the input audio signal and the filtered signal with the control circuit as disclosed by Kimura to produce a dynamically changing frequency response and longer duration of bass frequencies resulting in a higher fidelity audio signal. Kimura as modified does not disclose a power amplifier coupled to the summing circuit for increasing the power of the output signal from the summing circuit or the corner frequency is inversely related to the audio input signal.

House discloses a controllable bass contour device (Figure 2) including a power amplifier (reference 9) for increasing the power of an audio signal. House further discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Kimura's method uses a feed-forward approach of adjusting the low frequency boost while House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17). It would have been obvious to one or ordinary skill in the art at the time the invention was made to combine the feed-forward method and low-pass frequency boosting circuit as

described by Kimura with the inverse-signal to frequency filter disclosed by House in order to enhance the sound quality at lower signal levels.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

JIM

XU MEI
PRIMARY EXAMINER